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PHOTO BY DONNA GROSVENOR

Junior Guide Elizabeth Finch, Keeper Joe Clarkson, and Sakhi.

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THE NON-REPTILE HOUSE

The reptile house had its gala, black-tie opening in late February, 1931, when 1500 persons strolled, to the accompaniment of a small orchestra, past the most modern reptile exhibits of the time. Dr. William M. Mann, then Director of the Zoo, explained that although money for its construction, $125,000, was appropriated for an exhibition building for reptiles, amphibians, and insects, it would undoubtedly always be called "the snake house."

A study of the inhabitants of the house reveals that a great number of them are not snakes, lizards, turtles, or crocodilians. There are mammalians: the herpetologist in charge, Jaren Horsley; headkeeper Jack DePrato; his assistant, Lee Schmeltz; and six keepers. The avians are represented by occasional intruding sparrows and the red-billed Formosan blue pie which resides in the crocodile area. Then there are fishes, which include the salt-water fish in F-24 (see map), the lungfish in F-4, and the electric eels in F-6. In the phylum Arthropoda we have a crab in F-24, along with an Atlantic conch of the phylum Mollusca. Cage F-24 is also home to two more phyla, Annelida and Coelenterata with the exhibition of the plume worms and the sea anemones.

But by far the most numerous of the non-reptilians in the collection are the amphibians. As a matter of fact, in the years ahead we will probably see a growth in the number and variety of amphibians on exhibit, simply because they are interesting and important as the vertebrate link between the fishes and the later-day reptiles, birds, and mammals. As their name implies, most of these animals lead a double life, passing from an aquatic phase (complete with gills for breathing) to a terrestrial phase (with the development of lungs for the direct intake of oxygen). Yet even after leaving the larval stage some of these poikilotherms (cold-blooded creatures, like snakes) are bound to water, for their skin needs constant moisture.

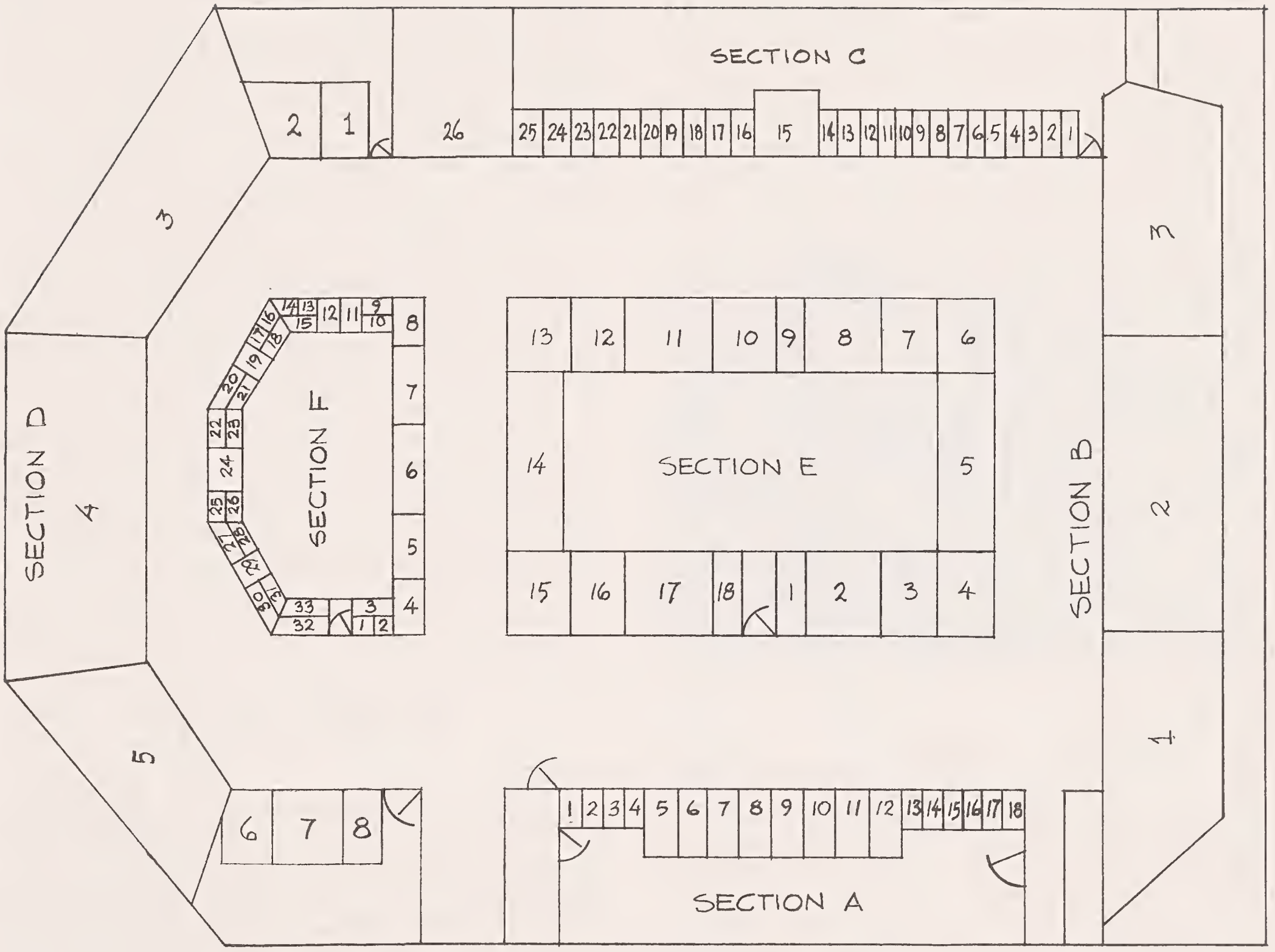
The class Amphibia, in the phylum of Chordata, is composed today of three living orders: the Gymnophiona (caecilians—legless, burrowing, tropical, primitive, almost blind, slimy, smooth-skinned and, unlike other amphibians, carnivorous, resembling oversized earthworms, up to 4 feet long), which are found in both hemispheres; the Caudata (salamanders, newts, sirens, mudpuppies, and amphiumas); and the Salienta, the most popularly known amphibians, the frogs and toads.

In the reptile house you will find no caecilians, as they are difficult to obtain, but you will find four of the eight families of salamanders and eight of the eighteen families of frogs and toads.

Of special interest among the salamanders is the giant Japanese salamander which can be seen in cage E-9. Our specimen was received on July 22, 1963, and is approximately 30 inches long. A Chinese species is quite similar but not as large, reaching a maximum length of 3-1/2 feet as opposed to over 5 feet for the Japanese variety. The first living example of the giant salamander brought to Europe in 1829 lived for 52 years in captivity after being taken from its mountain stream. Japanese fishermen easily capture them for food by using a simple hook and line. These giants must surface every six to ten minutes to breathe, and live on a diet of fresh-water food, such as fish, other salamanders, worms and insects. The only North American representative of this family is the hellbender (Cryptobranchus alleganiensis), which is found in fast-flowing streams and rivers from New York to Alabama and west to Arkansas.

In cage F-15 one will see the tiger salamander of the family Ambystomatidae. It ranges from Canada to Mexico. This species along with the eight forms of the genus Necturus (which includes the locally found mudpuppy) are examples of neoteny, which is the ability to breed while still in the gilled state. The tiger salamander is the most interesting since its failure to metamorphasize is conditional on either insufficient iodine in the water, or the water's coldness. Both factors inhibit the thyroid production necessary for the usual lung development. In Mexico's higher altitudes and colder waters the larval stage of tiger salamander was known as the axolotl, and was thought to be a separate species. It was only when one was placed in captivity at a warmer water temperature that a confounded collector discovered his pet axolotl changing into a plain old tiger salamander.

In cages F-17 (L) and F-17 (R) one will see the brightly colored and attractive newts



FLOOR PLAN, REPTILE HOUSE

along with a fire salamander that make up our collection's representation of the family Salamandridae.

One of the most unusual family members of the order Caudata is the amphiuma; one of the two known species can be seen in cage F-21. This two-toed amphiuma (Amphiuma means) or "Congo eel" as it is sometimes called, due to its apparently limbless, eel-like appearance, has tiny, useless limbs at each end of its elongated body. Like most of the salamanders, amphiumas range throughout the Gulf and southeast Atlantic States but are seldom seen because of their secretive nature.

The third order of amphibians is by far the largest (2,600 species) and the best known. Toads and frogs of the order Anura have not broken their link to the aquatic life but of all the amphibians they have come closest to taking up a terrestrial existence. One has only to see a frog jump to know just how efficiently it uses its limbs. Since the Zoo's collection includes some 86 species, only a few will be noted here, the rest being left to the Zoo visitor who wants to discover another section of the animal kingdom that is rich in beauty, adaptability, and variety.

Cage F-22 contains the African clawed frog and the Congo pygmy frog of the family Pipidae, which are the tongueless frogs of Africa and South America. From the latter area the best known example is the Surinam toad, which has fascinated naturalists because the eggs are deposited, incubated, and hatched in tiny membranous pockets on the female's back. All of the family have long, slender fingers which they use to sift through the mud of ponds and streams, scavenging for bits of food that can be fanned up into their eager, tongueless mouths. They are extremely aquatic and are a joy to watch as they dart about their tanks.

In cage F-16 (R) the amateur zoo naturalist can try his hand at finding our single representative of the family Pelobatidae or the spadefoots. Our species is the Asiatic horned frog and before you decide that it's buried in the sphagnum moss, look again at the dry leaves to be sure that two of them aren't the frog's horns on the side of his head. As an additional help, look at the photograph.

PHOTO BY DONNA GROSVENOR

Picture Puzzle: When the Asiatic horned frog (Megophrys monticola nasuta) is kept on a floor of leaves, it virtually disappears into the background, so well does it blend in with its surroundings. The genus Megophrys is found in forested areas of southern Asia and the East Indies, where there is a large leaf litter accumulation. During the day it is hard to see the frog, but at night the reflection of light beams off its eyes makes it easy to find. There really is a frog in the picture; see if you can find it, either here or when you visit it in the reptile house.

The next family, Leptodactylidae, is most confusing since one of our three species is called the Colombian horned frog (cage F-27). In fact, it is believed that the whole family is from a very old "family tree", as some species are even found in Australia.

In cage F-10 are the most distinguished of our leptodactylids, the South American bullfrogs, which can weigh two pounds and reach a length of 8-1/2 inches.

The toads (family Bufonidae) have some nine ambassadors here at the reptile house. They can be differentiated from the more streamlined frogs by their fat bodies and shorter legs. To the taste they differ in exuding a defensive poison when grasped in the mouth of a predator. The Colorado River toad (cage A-17) has an especially poisonous secretion and is known to have caused the death of a large German shepherd dog that seized one of the species in its mouth.[1]

[1] Living Amphibians of the World, Doris M. Cochran, Doubleday & Co., p. 96.

The true frogs (family Ranidae) and particularly the American bullfrog (also in cage A-17) are perhaps most familiar to us since they occur in great numbers in swamps and shallow lakes. They are used in laboratories for studies of comparative anatomy, and appear on dinner tables as a delicacy—frog legs.

Rounding out the order Anura and the class Amphibia are perhaps the two most beautiful families of all. Of the Hylidae we have the tree frogs in F-29 and the arrow-poison frogs (family Dendrobatidae) in F-20.

And, as long as you're in the building, why not have a look at some of the reptiles—the lizards, snakes, turtles, and crocodiles—because, after all, if it weren't for them we wouldn't have a so-called reptile house.

—Warren Iliff

REPTILES NEED HELP IN ORDER TO SURVIVE

Reptiles inhabited the earth long before there were mammals and they may even survive us. Some of the world's reptilian forms are doing quite well despite what the human race is doing to the natural world. Snakes and lizards are holding their own, generally speaking. Nonetheless, certain forms and species of reptiles are known to be on the decline. Man as usual is largely responsible. All that turtle soup. All those lizard shoes.

The reptile world is divided into five orders. The four larger ones are the crocodilians, the snakes, the lizards and the turtles. The fifth order contains the lizard-like tuatara, all alone, an order to itself. The survival picture is uneven and difficult to assess except in a few individual instances. Are there more snakes nowadays, as some authorities suggest? Fewer gavials? Can chameleons adapt to changing conditions? There is more guesswork than scientific evidence in the majority of answers.

The order of lizards contains several families that have suffered from exploitation. Lizards are edible and many have valuable skins. There are nearly 3,000 identified species of lizards. All prefer warmer climates, although some withstand cooler areas if the

ground does not freeze. Monitor lizards belong to the zoological family Varanidae. Their habitats range from desert to tropical forest over most of Africa, southern Asia, the Malay Archipelago, Australia, and oceanic islands of the Pacific. The largest of all lizards, the hefty Komodo dragon (Varanus komodoensis), belongs to this interesting family of warmth-loving carnivores. Unfortunately for the monitors, people in most areas they have inhabitated have found them excellent food. Their skins, like the skins of most larger reptiles, are valuable commercially. In all tropical countries, commercial collecting over the years has done great damage to populations. In 1932 more than 600,000 reptile hides were shipped from Calcutta alone. Most were lizard skins, with monitor lizard skins predominant.

The National Zoo is fortunate to have on display a Komodo dragon. The rare reptile was a gift several years ago from Indonesia's President Sukarno. These giant lizards reach lengths of nine or ten feet. Hefty brutes, which resemble ancestors of the Eocene, fifty million years ago, they have survived on a handful of arid Indonesian islands. Here the human population clings to the coastline and leaves the forbidding interior to the wild fauna. However, fewer than a thousand Komodo dragons remain. Their foothold is precarious.

Monitor lizards are not the sole lizards exploited. Iguanas of tropical America have always been hunted for flesh and hide. One unique island form of iguana on the Caribbean island of Anegada is threatened with extinction as plans move ahead for a major airstrip.

On the whole, however, the world's lizards fare better than its crocodilians. These include all alligators, crocodiles, caimans, and gavials. With the exception of the Chinese alligator, the alligators and caimans are western hemisphere species. American alligators were once common in lakes, rivers, and swamps along the Gulf of Mexico, far up the Mississippi River and along the Atlantic Coast to North Carolina. In much earlier times they had a far greater range. Extensive killing both for hides and sport has destroyed them in all but a scattering of protected areas. The maximum size has been reduced along with the population. Record measurements of alligators 18 or 19 feet long taken late in the nineteenth century are considered reliable. Today a twelve-footer is rare.

Tourist and novelty trades accounted for hundreds of thousands of young alligators. Alleged reports of alligators living in the sewer systems of large cities might not be too incredible considering the number of bathtub pets disposed of by overtaxed mothers. Herpetologist-author Clifford Pope records that in 1890 about 8,400 baby alligators were sold to tourists in Jacksonville, Florida, alone. The trade has recently been curtailed. Interesting to note, the State of Texas has just passed strict legislation to protect its remaining alligators. The new law states that it is unlawful to take, kill, buy or sell, or to possess an alligator or its hide in Texas. The Chinese alligator is similar to our own. Its range was probably continuous at some early date. The differences between the two are elusive enough to have inspired a remark over-heard in the reptile house, one the keepers like to repeat. A small boy could not get a satisfactory explanation from his father of the difference between the two kinds of alligators. Finally his father shrugged and said, "I don't know, son. I guess it's just that the Chinese alligators eat Chinamen and the American alligators eat Americans."

For the records, alligators are not as aggressive as crocodiles and are not known to eat either westerners or orientals.

The true crocodiles are distributed in a thin band around the world in tropical latitudes. Trade in their hides has virtually erased the reptiles from some areas and severely reduced populations in others. In Africa, for instance, after World War II, crocodile hunting became lucrative business. Estimates can claim no accuracy, but if a single hunter can shoot 8,000 crocodiles (an alleged fact), the report of 60,000 killed in East Africa in 1965 does not seem impossible. Today the distribution of crocodiles is spotty and the outlook for the future is relatively dim.

Most true crocodiles are indigenous to the eastern hemisphere. Four species inhabit North and South America, including a few remnants of an American crocodile population at the tip of Florida.

Nature gave the turtle that wonderful shell as a defense against natural enemies. But man is not a very natural enemy. Of all the reptiles threatened by a changing world none seems more down on his luck than the larger and edible turtles, especially the land-dwelling species. Turtles range in size from the huge sea-going leatherback, which reaches lengths of nine feet, to little three- and four-inch mud turtles. Turtles live on land; in fresh water; at sea. Those that live on land are generally called tortoises. Those preferring water are usually called turtles. Scientifically speaking, the rule is not rigid and they are all turtles.

The green turtle is probably the most economically valuable of all the reptiles. This is the great soup turtle. Its numbers have been enormously reduced by commercial exploitation. Diamondback terrapins, another culinary favorite, were so reduced in numbers in the United States that the government launched expensive programs to propagate and restore them. The giant tortoises of the Galapagos Islands have met the saddest fate of all. These noble, lumbering reptiles surely deserve a place on earth to live out their last few million years. As it is, they are evidently doomed to extinction very soon. When man came to the Galapagos Islands he brought cats, dogs, pigs, and rats. The big tortoises' eggs were dug up and eaten in great numbers. They themselves were slaughtered relentlessly for food and oil. It is probably too late to save them. The giant tortoises in the National Zoological Park are relics of a vanishing world.

—Jocelyn Arundel

A KEEPER'S LOOK AT REPTILE AND AMPHIBIAN CONSERVATION

An Interview with Assistant Headkeeper Lee Schmeltz

Q. Lee, what is the conservation picture for reptiles and amphibians?

A. To put it bluntly, they are the most neglected of our fauna in the scope of most conservation efforts.

Q. What can the Zoo do to assist in making the situation better?

A. Several things:

Provide the public with accurate information pertaining to their importance to the ecology of a given area and acquaint the public with the possible repercussions when a single group, such as the common grass snake, is reduced in numbers or removed from the area.

Discourage the collection of specimens as pets and encourage the study of the same specimens in their natural habitat.

Discourage the commercial exploitation of this segment of our natural heritage, as, for instance, by refusing to purchase articles of alligator leather.

Provide accurate information to dispel the many erroneous beliefs that still circulate pertaining to reptiles and amphibians and thereby (we hope) curtailing the indiscriminate slaughter of these groups.

Teach the general public to appreciate these life forms as valuable assets, economically, esthetically, and with a bit less apprehension and more common sense.

Q. What are your and your fellow keepers' chances for success, Lee?

A. Through these efforts we hope some day to see our charges removed from the role of the bad guys (in the eyes of the general public) and receiving some of the consideration and protection afforded long ago to other wildlife forms.

—Warren Iliff

CONSERVATION, ANYONE?

The University Press of Kentucky has announced The Kentucky Fellowship, a $5,000 grant for the best work in progress on any aspect of ecology or conservation. Inquiries should be addressed to The University Press of Kentucky, Lexington, Kentucky, 40506.

SALT-WATER AQUARIUM

Why take on a project like a salt-water aquarium? Most people find it fascinating to observe bizarre creatures, and this exhibit has been set up to illustrate the commensal

relationship between vertebrates and invertebrates. As you look at the tank in the reptile house you will see fish swimming in and out of three flower-like objects. These beautiful "flowers of the sea," as they are often called, are living animals named sea anemones. One cannot explain the reason for this relationship, but I have noticed the fish seeking protection there whenever they become frightened. The fish swim within the poisonous tentacles of the sea anemones and are apparently immune to the poison. Some scientists believe that the clown fish (Amphiprion) secretes a body slime which inhibits the triggering of the sea anemones' poisonous nematocyst. The clown fish, however, will succumb to the sting of the nematocyst if the fish is in ill health. Clown fish also stay clear of some anemones, such as the Atlantic Coast Metridium, knowing quite well they mean certain death, since the secretion from the fish is only effective against certain anemones. The clown fish prefers a genus called Stoichactis, two species of which are on exhibit at the present time. One is from the Red Sea, and the tomato clown fish (Amphiprion ephippium), dominates the invertebrate entirely. The other species of Stoichactis is from Ceylon and is dominated by the common clown fish (A. sebae).

The feeding of sea anemones is quite simple; they are carnivorous and are fed on shellfish. The clown fish have the same diet, with the addition of spinach, as fish need vegetable matter to round out their diet. In the ocean, fish nibble at algae, thus procuring needed vegetable matter.

In the same tank are other interesting creatures. One is a fan worm (belonging to the class Polychaeta) which feeds on plankton and debris in the water. This sedentary worm is able to pull its "fan" or plume completely in when it is disturbed. The tank contains an Atlantic conch which feeds on leftover shellfish forgotten or uneaten by the fishes. Recently while crabbing on Chesapeake Bay I brought back a crab, introduced it to the tank, and it is thriving on the prepared spinach diet.

The most interesting aspect of maintaining a salt-water aquarium is the water chemistry. I am using artificial salt mix, which contains all the needed components, with tap water. With the artificial salt water one does not have to worry about introducing alien bacteria or protozoans which might do harm to the specimens. When any animal is taken from its natural environment it becomes susceptible to disease which would be controlled by counter-agents in its native state. On the other hand, some animals, particularly ciliary feeders, need the bacteria and protozoans as food. For that reason I always let the filter run for at least two weeks before putting specimens in, so that some protozoans will be introduced and the ciliary feeders will get nutrient from the water and not starve.

The filtering system is necessary to take out unwanted wastes. Since the aquarium is a closed system, the same water is used continuously unless altered. The beautiful Seaquarium in Miami has an open system, and does not need filters in individual tanks. Fresh sea water is being pumped in from the ocean every minute of every day. There is one filter which takes out the pollution though much of the bacteria and protozoans remain intact.

In short, setting up a salt-water aquarium takes time and effort, but the indescribably beautiful result is certainly worthwhile.

—Michael Johnson

NEW PERSONNEL

Jaren Horsley came to the National Zoo on February 5, 1969, as herpetologist and curator in charge of the reptile division. Previously he had spent three and a half years in a similar position at the Oklahoma City Zoo. Mr. Horsley received his Bachelor's

PHOTO BY DONNA GROSVENOR

Herpetologist Jaren Horsley admires a frog-eyed ground gecko (Teratoscincus scincus).

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degree in biology and his Master's in zoology at San Francisco State College.

While in Oklahoma City he continued his graduate studies under Dr. Charles Carpenter of the University of Oklahoma. Mr. Horsley is continuing his research here at the Zoo on lizard behavior, which will be the subject of his doctoral thesis.

Jaren not only brings to the Zoo his herpetological skills but adds great dimension to the future scientific and educational programs, signs of which are already evident in the reptile house exhibits.

THE FONZ JUNIOR GUIDES

This past summer 19 Junior Guides, between the ages of 14 and 18, worked with the "Summer in the Parks" program during the months of July and August. The Junior Guides had a four-day training course the last week of June, and on the second of July began working regularly each Monday, Wednesday, and Friday from 9:45 to 12. It was a most successful program; the guides were enthusiastic about their work and were unfailingly prompt and able to communicate well with the children who came for the tours.

The Juniors also helped with the information booths during the summer, and those who are able to do so are continuing to work with occasional Saturday Zoo tours as well as at the information booths.

How much these tours meant can be judged by some of the letters received from children, all addressed to "Dear Zoo Guide".

"Thank you for telling us more than the signs did about the animals."

"Thank you for showing us the apes because I like it when you told us about the ape when it went up to the moon."

"Thank you for showing us around. We wouldn't known about the animals. I like the frogs. I have eleven of them."

"I like all of the animals that I saw. I like you too. I like the loin most of all."

"I liked the eleaphints. They whore a difarint color. I liked the lions and the tiger most of all. The pitchers were good to."

"I like the monkeys the best. And next to the best is the white tiger. He looks just like a cat."

"I enjoyed having you guide us around in the morning. I did discover something, some birds like peanuts, cookies and potato chips. I didn't know much about camels until I met you at the zoo. It was a lot of fun."

SENIOR GUIDES

Partly as a matter of curiosity, partly as a help in preparing training programs for the guides, records were kept of questions asked at the information booths on six different days when they were manned by senior guides. Information requested ranged from "Where is the jungle—the jungle house?" to "How do we get to the Lincoln Memorial?" Guides supplied maps of the Zoo showing the location of the various buildings; when asked, "Do you know where you are now?" one visitor said, "I think in the Washington Zoo." Out of 383 questions asked, 42 were for the location of restrooms, and three for drinking fountains. Directions on how to get to the bird house were asked for 19 times; the white tiger (sometimes referred to as the white lion) 14 times; sea-lions and elephants 5 times each; bears, especially Smokey, 11 times; snakes 3; monkeys 4; the Komodo dragon (once called Kokomodo) 5 times; 8 people wanted to know where the kangaroos were; 4 asked for first aid; and 7 wanted to know if they could rent strollers.

One youngster asked, "Are we allowed to ride the little animals?" Another wanted to know if the new "hooked" stock was open. One mother said in exasperation, "Now that you've given me some information, is there any information I can give you? These are all my children. I'll sell 'em to you cheap and even give you some green stamps." A pathetic appeal for help was: "I am French and I have lost. Do you have a plan?"

Tactful, patient, and imaginative, as well as knowing the Zoo and its inhabitants—these are the attributes of the FONZ guides.

Lucile Q. Mann, Editor